

## CLAIMS

What is Claimed is:

1. A heat exchanger for use in a combustor comprising:
  - at least one air passage; and
  - at least one premixed fuel/air passage sharing a common wall with said at least one air passage; and
  - a means for heating at least one side of said combustor to a temperature wherein combustion is initiated and propagated throughout said combustor in a cascade reaction.
2. The heat exchanger of claim 1 further comprising a temperature measurement device.
3. The heat exchanger of claim 1 wherein said passages are created by any of the group consisting of corrugated plates, tubes, and products of direct casting.
4. The heat exchanger of claim 1 further comprising a catalyst.
5. The heat exchanger of claim 4 wherein said catalyst is any of the group consisting of rhodium, platinum, and palladium.
6. The heat exchanger of claim 1 wherein the formation of any of the group consisting of CO and NO<sub>x</sub> is reduced.
7. The heat exchanger of claim 1 wherein said passages are arranged in a honeycomb formation.
8. The heat exchanger of claim 1 wherein said at least one side of said combustor is heated to a temperature in the range of 900°F and 1000°F.

9. A catalytic combustor for gas turbines comprising:

a plurality of layered plates; and

a catalyst; and

a plurality of air passages formed from said plates; and

a plurality of premixed fuel/air passages formed from said plates; and

a means for heating at least one side of said combustor wherein said means for heating warms a first layer of plates such that the energy of activation for said catalyst is achieved; and

a second layer of plates which is heated by said first layer of plates such that a chain reaction ensues wherein the energy of activation is overcome for each successive layer of said plurality of plates.

10. The catalytic combustor of claim 9 wherein said plates are corrugated.

11. The catalytic combustor of claim 9 wherein said catalyst is any of the group consisting of rhodium, platinum, and palladium.

12. The catalytic combustor of claim 9 wherein said means for heating is any of the group consisting of an electric heater, a gas heater, and direct partial combustion of incoming air.

13. The catalytic combustor of claim 9 wherein said energy of activation is in the range of 900°F and 1000°F.

14. The catalytic combustor of claim 9 wherein said combustor reduces the formation of any of the group consisting of CO and NO<sub>x</sub>.

15. The catalytic combustor of claim 9 wherein said chain reaction occurs in a cascade.

16. The catalytic combustor of claim 9 further comprising a temperature measurement device.

17. A method of activating a catalytic combustor for gas turbines comprising the steps of:

applying heat to at least one side of said combustor for heating the air located in a first layer of air passages; and

heating the plates which form a side of said first layer of air passages by way of said heated air; and

blowing said heated air through said first layer of air passages; and

redirecting said heated air into a layer of premixed fuel/air passages; and

heating the plates which form a side of said premixed fuel/air passages by way of said heated air; and

providing fuel to said premixed fuel/air passages wherein combustion occurs; and

directing the resulting thermal energy products into a turbine to produce power while thermal energy from the combustion process heats incoming air in successive layers.

18. The method of claim 17 wherein said plates are corrugated.

19. The method of claim 17 wherein the premixed fuel/air sides of said plates are coated with a catalyst.

20. The method of claim 17 wherein said catalyst is any of the group consisting of rhodium, platinum, and palladium.

21. The method of claim 17 wherein said air is heated to a temperature in the range of 900°F and 1000°F.

22. The method of claim 17 wherein the formation of any of the group consisting of CO and NO<sub>x</sub> is reduced.

23. A catalytic combustor for gas turbines comprising:

- a plurality of layered tubes; and
- a catalyst; and
- a plurality of air passages formed from said tubes; and
- a plurality of premixed fuel/air passages formed from said tubes; and
- a means for heating at least one side of said combustor wherein said means for heating warms a first layer of tubes such that the energy of activation for said catalyst is achieved; and
- a second layer of tubes which is heated by said first layer of tubes such that a chain reaction ensues wherein the energy of activation is overcome for each successive layer of said plurality of tubes.

24. The catalytic combustor of claim 23 wherein said catalyst is any of the group consisting of rhodium, platinum, and palladium.

25. The catalytic combustor of claim 23 wherein said means for heating is any of the group consisting of an electric heater, a gas heater, and direct partial combustion of incoming air.

26. The catalytic combustor of claim 23 wherein said energy of activation is in the range of 900°F and 1000°F.

27. The catalytic combustor of claim 23 wherein said combustor reduces the formation of any of the group consisting of CO and NO<sub>x</sub>.

28. The catalytic combustor of claim 23 wherein said chain reaction occurs in a cascade.

29. The catalytic combustor of claim 23 further comprising a temperature measurement device.